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Refined Modeling Analysis for Jefferson County 1-Hour SO_2 Nonattainment Area
Draft White Paper – August 2014

Monitoring Background

Prior to the June 22, 2010 promulgation of the 1-hour Sulfur Dioxide (SO_2) primary National Ambient Air Quality Standard (NAAQS), all of Missouri maintained compliance [would now be classified as "unclassifiable/attainment" per current EPA protocol] with the previous primary and secondary SO_2 NAAQS. In fact, monitored values of the previous primary SO_2 NAAQS (both 3-hour and 24-hour averaging periods) were historically recorded well below the standard which enabled the Air Program to discontinue operation [prior to 2007] of several SO_2 monitoring sites where violations were not an issue. Further, in 2010, five additional SO_2 monitoring sites that were not recording violations of the 1-Hour SO_2 NAAQS were temporarily discontinued primarily due to state budgetary concerns. Of these five SO_2 monitoring sites, the Mark Twain State Park (MTSP) site resumed SO_2 background monitoring on July 1, 2012. The highest concentration recorded at the MTSP site in 2014 thus far is 13 parts per billion (ppb).

After promulgation of the new 1-hour SO_2 standard, two areas (portions of Jackson County in the Kansas City area and portions of Jefferson County in the Herculaneum area) were designated as nonattainment [in August 2013]. This was based on monitoring data from the remaining monitoring network for calendar years 2007 through 2009, as well as later data from calendar years 2010 through 2012. The violating monitor (i.e. Herculaneum Mott Street monitor) location was selected to characterize source specific [Lead and SO_2] emissions from the Doe Run Herculaneum primary lead smelter. SO_2 NAAQS violations at the Herculaneum Mott Street monitor are predominantly attributable to this large SO_2 source. In December 2013, the Doe Run Herculaneum primary Lead smelter ceased operations, and since then monitored values recorded at the Herculaneum Mott Street monitor have been dramatically lower. Specifically, for the first seven months of calendar year 2014 at the Mott Street monitor, the highest concentration recorded is 22 parts per billion (ppb) while the fourth highest concentration (99 %tile) recorded is 18 ppb. Based on estimated projections, the three-year design value for the Mott Street monitor is expected to be below 75 ppb [2010 1-Hour SO_2 NAAQS] by the end of 2015.

Exploratory Modeling

Recently available guidance includes the April 23, 2014 EPA release of "Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions", as well as the May 13, 2014 Federal Register Notice regarding the proposed Data Requirements Rule (DRR) for the 1-Hour SO_2 Primary NAAQS. Specifically, the Guidance and proposed DRR prescribe a modeling analysis that focuses on modeling the largest sources, and associated maximum concentrations, while accounting for interactive and contributing sources.

To this end, the Air Program recently initiated an exploratory modeling analysis on the violating Herculaneum Mott Street monitor based on the most recent 2014 SO_2 modeling guidance. The modeling analysis closely follows the approach used for permitting purposes to model the impacts of a single source. For example, the meteorological data set used to model Doe Run

Herculaneum is an on-site data set. Actual SO_2 emissions data from calendar year 2010 corresponding to the highest actual SO_2 emissions emitted at Doe Run Herculaneum was selected for analysis.

The analysis shows that the violating monitor is located in the maximum area of impact associated directly with the largest SO_2 source, Doe Run Herculaneum. The Air Program identified a High Impact Zone (HIZ) that demarcates the area where refined air dispersion modeling predicts the emissions from Doe Run Herculaneum, by themselves, would violate the 2010 1-Hour SO_2 NAAQS. The HIZ includes the area surrounding Doe Run Herculaneum and the violating Mott Street monitor.

The Air Program proposes to focus limited resources by investigating options to reduce modeled impacts of sources on the HIZ. A detailed modeling analysis of the HIZ will then be conducted to identify the SO_2 emission reductions necessary to model SO_2 NAAQS compliance within the zone for (a) all sources located throughout the existing Jefferson County SO_2 nonattainment area and (b) all large interactive sources located within a 50 km radius of the border of the existing Jefferson County SO_2 nonattainment area. The Air Program maintains that this approach will effectively provide timely SO_2 reductions in the area impacting and surrounding the existing Jefferson County SO_2 nonattainment area. The Air Program acknowledges that the 2014 modeling guidance was not available when the Program submitted its initial round of boundary recommendations but contends that this method for evaluating the violating monitor is appropriate to determine the area of concern surrounding the violating Mott Street monitor.

As a result of the HIZ modeling analysis, the Air Program plans to pursue the establishment of interim SO_2 emission limits for the three Ameren Missouri facilities: Rush Island, Meramec, and Labadie. The interim emission limits will be included in Table I of the new draft proposed state Sulfur Dioxide rulemaking 10 CSR 10-6.261 *"Control of Sulfur Dioxide Emissions"*. The projected compliance date for the limits is January 1, 2017. In addition to these interim limits, all three Ameren facilities will be required to establish SO_2 monitoring site(s) in coordination with the Air Program to begin operation within the next year.

<u>Considerations of HIZ Approach with Interim Emission Limits</u>

Based on the assumption that the monitored values will continue at the current rate, the Air Program expects that the three-year design value (2013 through 2015) for the Mott Street SO_2 monitor will qualify for a clean data determination by late 2015. According to EPA guidance, for a clean data determination, states are required to demonstrate that the design value of the 'clean' monitor is below 75 ppb and the 'clean' monitor is located in the area of highest SO_2 concentration for the clean data area. The Air Program maintains that when Doe Run operated the primary lead smelter, the Mott Street SO_2 monitor was properly located in the area of maximum SO_2 concentration. One argument is that after Doe Run stopped operating, the area of maximum concentration moved further south & closer to the remaining largest SO_2 source within the nonattainment area: Ameren Missouri – Rush Island. However the Air Program asserts that the area of maximum concentration must be maintained with the original purpose

of the monitor. In this case, the purpose of the monitor was to capture the impact of Doe Run Herculaneum.

Beyond the main issue of the location of the clean monitor, a clean data approach means that certain State Implementation Plan (SIP) regulatory requirements are suspended: (1) Reasonable further progress requirements, (2) Attainment demonstration element (using dispersion modeling), and (3) Contingency measures. These items are suspended as long as the affected area continues to attain the standard. SIP requirements that are maintained as part of a clean data determination include development of both a maintenance plan and a formal redesignation recommendation. If all clean data elements are not satisfied, the Air Program is at risk of triggering a "clock" set by the Clean Air Act that requires EPA to issue a Federal Implementation Plan (FIP) in lieu of an approvable attainment SIP submittal.

The HIZ approach outlined above includes the following advantages: (1) Incorporation of the current methodology [outlined in EPA SO_2 guidance & proposed DRR rule] to focus on the large sources individually, while also considering interactive source impacts, (2) Utilization of the strengths of the AERMOD model which best represents SO_2 impacts near large sources [aka near field analysis], (3) SIP strengthening elements gained by requiring interim SO_2 emission limits and SO_2 monitoring at three Ameren locations, and (4) Effort to submit SIP rather than waiting for clean data and risking initiation of FIP clock.

Timeline Constraints

The current attainment plan development schedule is limited by the development of the new proposed state SO_2 rulemaking. Current projections of the proposed new 10 CSR 10-6.261 rulemaking include filing with the Secretary of State's Office approximately in April 2015 with a December 2015 rule effective date. The attainment plan schedule currently includes submitting an attainment plan to EPA, with modeling, for both the Jefferson County and Jackson County 1-Hour SO_2 nonattainment areas in the fall of 2015 [after adoption of the new proposed SO_2 rule by the Missouri Air Conservation Commission]. Note that EPA's schedule requires states to submit an attainment plan by April 6, 2015.